



First record of *Goniopteris schaffneri* (Fée) Salino & T.E.Almeida, comb. nov. (Thelypteridaceae) and *Marattia laxa* Kunze (Marattiaceae) in the state of Hidalgo, Mexico

Adriana G. Hernández-Álvarez, Arturo Sánchez-González, Yarely Pérez-Atilano

Universidad Autónoma del Estado de Hidalgo, Instituto de Ciencias Básicas e Ingeniería, Centro de Investigaciones Biológicas, Ciudad del Conocimiento, Km 4.5, Carretera Pachuca-Tulancingo, Mineral de la Reforma 42184, Hidalgo, Mexico.

Corresponding author: Yarely Pérez-Atilano, yarelyatil@gmail.com

Abstract

The presence of *Goniopteris schaffneri* (Fée) Salino & T.E.Almeida, comb. nov. and *Marattia laxa* Kunze is reported for the first time for the state of Hidalgo, Mexico. This note gives the descriptions of both species and information on the types of vegetation where they were found. The *Marattia laxa* record is particularly important as the species is currently included in the NOM (Mexican Official Standards) as “subject to special protection.”

Key words

Ferns; habitat; montane cloud forest; morphology; new records; distribution; protection.

Academic editor: Denise Costa | Received 5 July 2016 | Accepted 27 June 2017 | Published 24 November 2017

Citation: Hernández-Álvarez AG, Sánchez-González A, Pérez-Atilano Y (2017). First record of *Goniopteris schaffneri* (Fée) Salino & T.E.Almeida, comb. nov. (Thelypteridaceae) and *Marattia laxa* Kunze (Marattiaceae) in the state of Hidalgo, Mexico. Check List 13 (6): 831–835. <https://doi.org/10.15560/13.6.831>

Introduction

The ferns of Mexico have been extensively studied in recent works, which cover states and regions considered to have high biological richness, such as Oaxaca (Mickel and Beitel 1988), Veracruz (Tejero-Díez et al. 2011) and the Valley of Mexico (Tejero-Díez 2007, Arreguín-Sánchez et al. 2009). However, further fieldwork has led to increasing numbers of plant specimens being collected in other regions, expanding knowledge both of the ranges of the species and ranges of variation in their morphological characteristics and the environmental conditions where they grow (Rojas-Alvarado and Tejero-Díez 2002, Pérez-Paredes et al. 2012).

Methods

To learn more about the richness and distribution patterns of ferns and lycopods in the state of Hidalgo, various vegetation types and locations have been systematically explored over the last decade (Álvarez-Zúñiga et al. 2012, Pérez-Atilano et al. 2015). Expeditions in 2013 in the montane cloud forest (MCF) collected specimens of *Goniopteris schaffneri* (Fée) Salino & T.E.Almeida, comb. nov. at La Mora, Jacala de Ledezma, Hidalgo, in a transition zone with semi-deciduous tropical forest ($21^{\circ}07'26.20''$ N, $099^{\circ}09'39.84''$ W; 1121 m a.s.l.) and *Marattia laxa* Kunze at Chilijapa, Tepehuacán de Guerrero, Hidalgo ($21^{\circ}00'54.4''$ S, $098^{\circ}52'07.9''$ W, 1,361 m above sea level [a.s.l.]). Both finds proved to be new

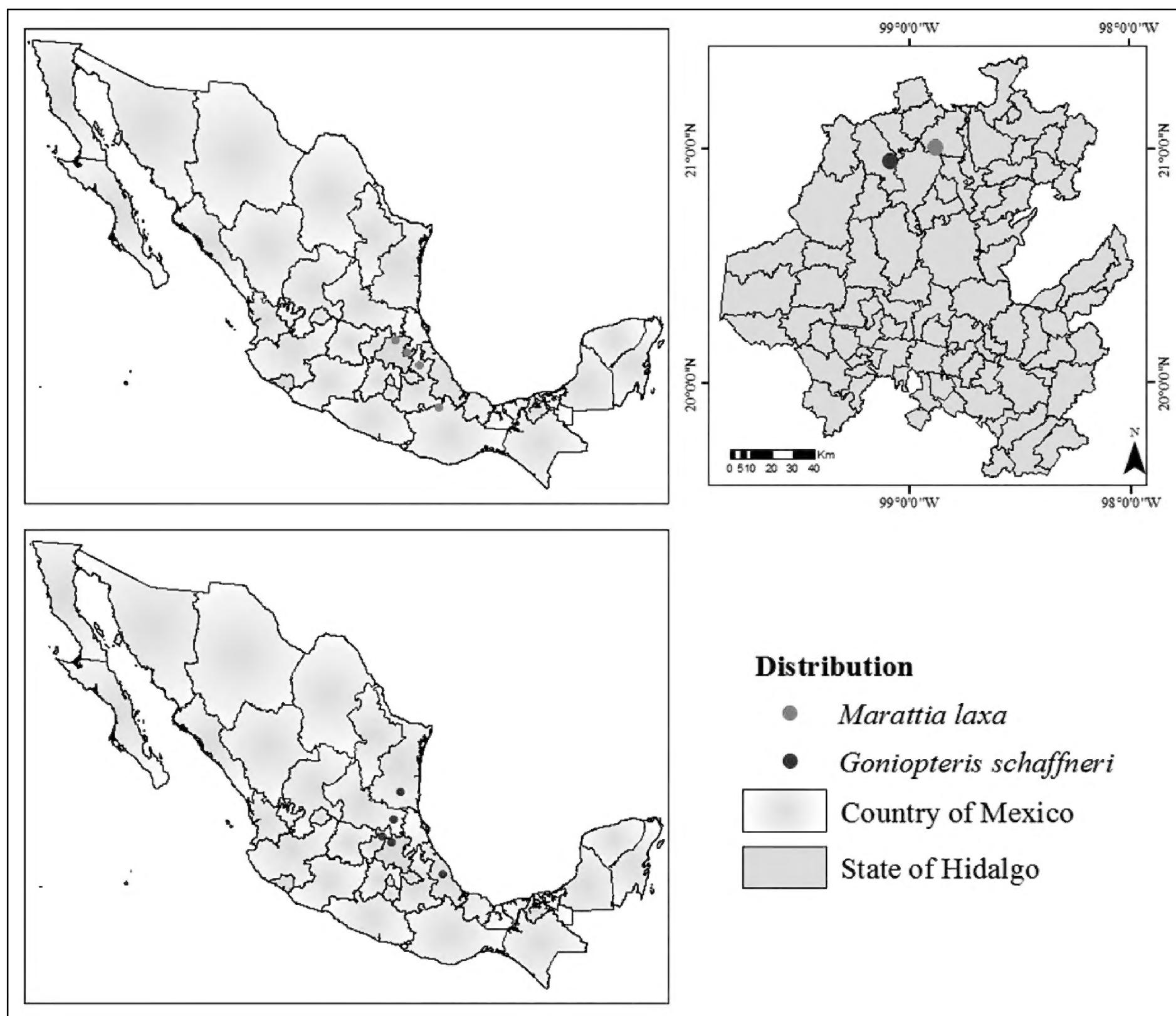


Figure 1. Distribution of *Goniopteris schaffneri* and *Marattia laxa* in Mexico and State of Hidalgo, showing the news records to the species (*Goniopteris schaffneri*; blue circle and *Marattia laxa*; orange circle).

records for the state of Hidalgo (Fig. 1). Individuals of these species, both 100 cm tall, are quite conspicuous, and it is therefore somewhat surprising that they have not been collected in this region previously.

The specimens were collected according to the classic method described by Lorea and Riba (1990). The plant specimens (AGHA70, EAZ562, YPA154 and ASG4300) were deposited in the HGOM herbarium (Universidad Autónoma del Estado de Hidalgo, Hidalgo), and duplicates were donated to the MEXU National Herbarium (Universidad Nacional Autónoma de México, Estado de México). The collection of the specimens were legally performed under the permit NUM.SGPA/DGVS/02750/13 issued by the General Directorate of Wildlife of the Secretaría de Medio Ambiente y Recursos Naturales (Semarnat).

To corroborate the distribution of these species in Mexico, the work of Mickel and Smith (2004) was consulted. In addition, the literature was reviewed, as were the specimens of these ferns deposited in the following herbarium collections: HGOM (Universidad Autónoma del Estado de Hidalgo), MEXU (Universidad Nacional

Autónoma de México), ENCB (Instituto Politécnico Nacional) and CHAPA (Colegio de Postgraduados).

Results

Detailed descriptions of both species are found in the work of Mickel and Smith (2004); thus, only a brief summary is included in the present study, with photographs of the main features and information on the environments where they were found.

***Goniopteris schaffneri* (Fée) Salino & T.E. Almeida, comb. nov.**

The family Thelypteridaceae consists of some 5–32 genera (Smith et al. 2008), of which only *Goniopteris*, *Thelypteris* and *Macrothelypteris* are found in Mexico. The genus *Goniopteris* has long been recognized as a natural group and is characterized for the presence of furcate or stellate hairs on the blades and/or rhizome apex scales (Salino et al. 2015).

The specimen was collected at the town of Mora, Jacala de Ledezma municipality in northwestern Hidalgo,

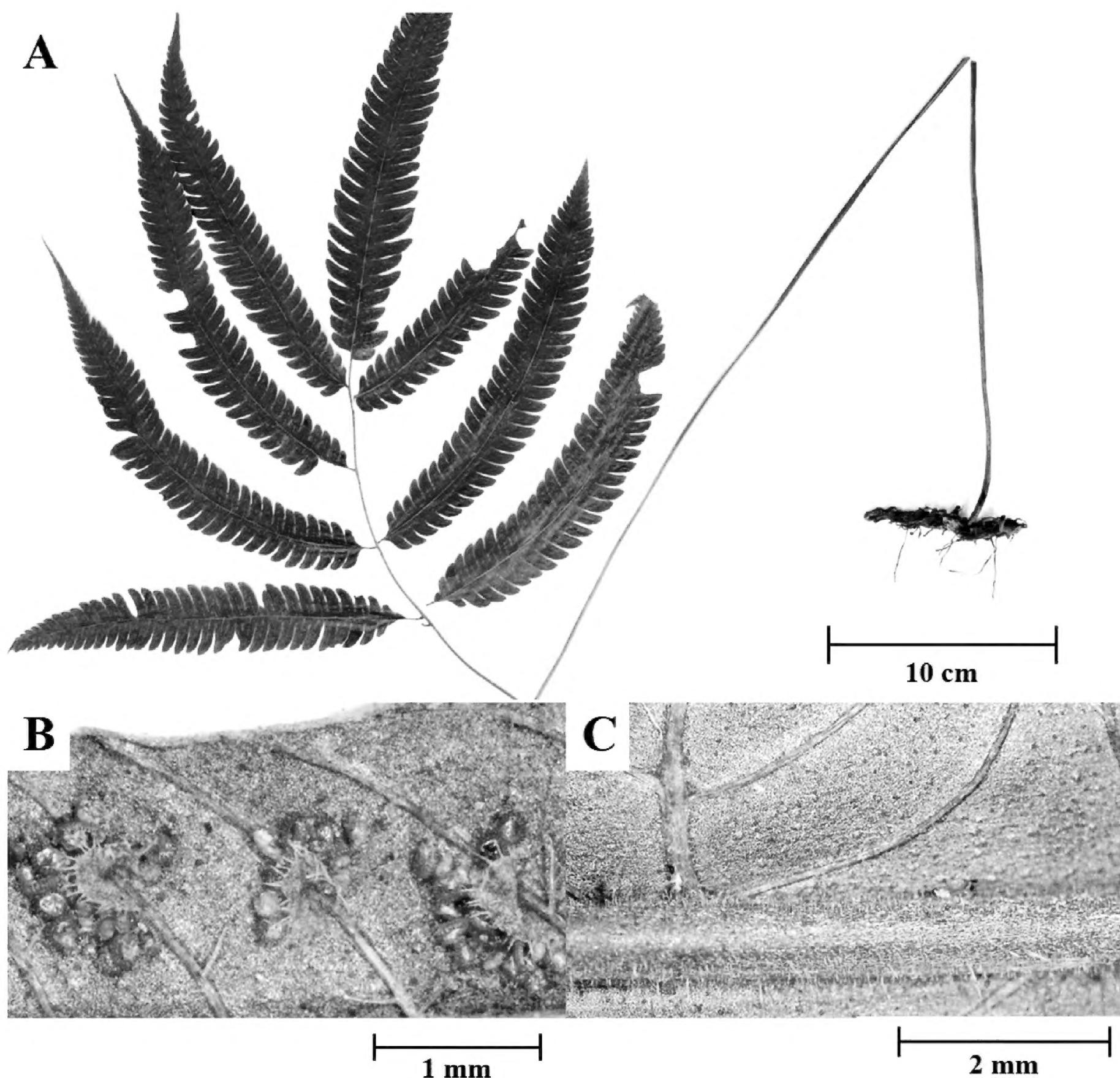


Figure 2. Specimen of *Goniopteris schaffneri* from the state of Hidalgo, Mexico. **A.** Frond. **B.** Sori with indusium. **C.** Costa and costule.

in a highly disturbed patch of MCF. In the canopy, *Liquidambar macrophylla* Oerst. and 2 species of oak, *Quercus affinis* Scheidw. and *Quercus polymorpha* Schltdl. & Cham., were codominant.

Description. Fronds monomorphic, 65–110 cm long (Fig. 2a); stipes stramineous to brownish with scattered to dense furcate and stellate hairs ca 0.1 mm long; blades 1-pinnate-pinnatifid with 3–7 laterals pairs and a conform one, 15–25 × 2.5–4 cm; segments acute or obtuse; veins ca 15–18 pairs per segment; rachises with simples and stellate hairs. It is distinguished mainly by presenting simple and scattered hairs on the costae, costules and veins on the abaxial surface of the blade, lack of buds in the axils of the distal pinna and present submarginal sori, with indusia whitish, persistent, reniform and marginally setose (Fig. 2b, c).

Distribution. According to Mickel and Smith (2004), the species has a terrestrial growth habit and is found in

tropical deciduous and semi-deciduous forest in Mexico in an elevation range from 800 to 1650 m a.s.l. It has been collected in the states of Querétaro, San Luis Potosí, Veracruz and Tamaulipas.

Marattia laxa Sw.

The family Marattiaceae comprises 4 genera (Smith et al. 2008). Of these, Mickel and Smith (2004) recorded the presence of *Danaea* and *Marattia* in Mexico. *Marattia* is a pantropical genus with about 60 species that grow in wet forests of higher elevations, mostly in the South Pacific. This genus is distinguished by long, fleshy fronds, large stipules and synangia (Mickel and Smith 2004). In Hidalgo, the stipules are used as food; hence, its local name of “maíz del monte”.

The specimen was collected in a small patch of MCF at Chilijapa in Tepehuacán de Guerrero municipality, Hidalgo. The forest canopy is dominated by *Quercus* spp. and *Liquidambar styraciflua* L. The tree ferns *Alsophila*

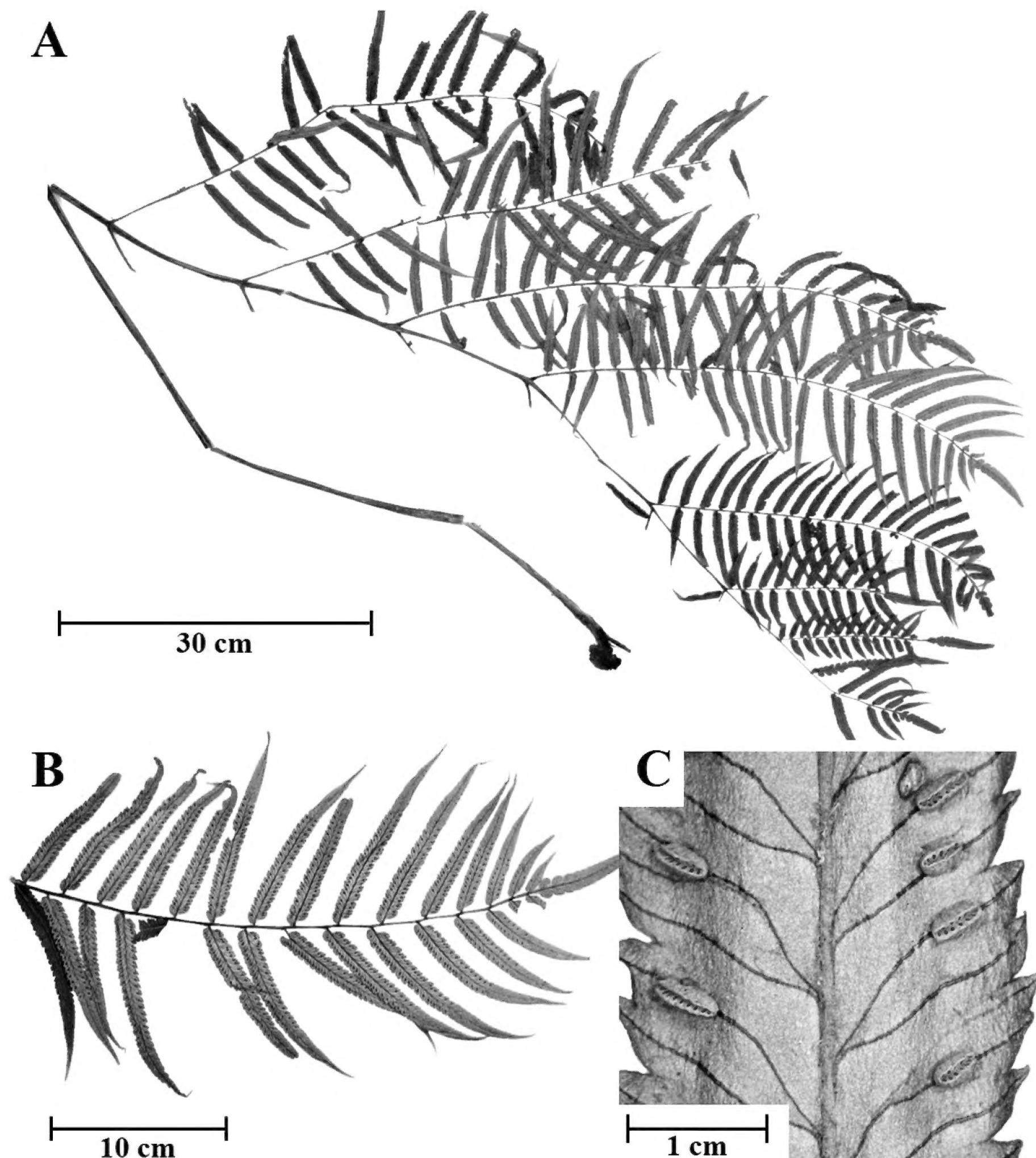


Figure 3. Specimen of *Marattia laxa* from the state of Hidalgo, Mexico. **A.** Frond. **B.** Medial pinna. **C.** Synangium.

firma (Baker) D.S. Conant and *Cyathea fulva* (M. Martens & Galeotti) Fée, are commonly found in the lower canopy, with *Psilotum nudum* (L.) P. Beauv. growing on them. Some species of Melastomataceae dominate the understory, and individuals of *Marattia laxa* are conspicuous. Several species of ferns, mainly of the genera *Asplenium*, *Dennstaedtia*, *Goniopteris*, *Pecluma*, *Polypodium*, *Polystichum*, *Pteris* and *Thelypteris*, are dispersed among the various substrates (soil, rock and trees).

Description. Fronds bipinnate, 1.5–4 m long (Figure 3a), main characteristic that differentiates it easily from the

other two species making up the genus in Mexico (*M. excavata* Underw. and *M. weinmannifolia* Liebm.); pinnales 10–30 × 1–3.2 cm, narrowly oblong, truncate or cordate auriculate, apices acuminate, margins serrulate, veins free, 1 or 2 times forked in which are located sinangium clamshell (Fig. 3b, c).

Distribution. According to Mickel and Smith (2004), this species grows on rocky Atlantic-facing slopes in humid pine forests at high elevations between 750 and 2500 m a.s.l. in *Pinus*–*Quercus* forests and montane cloud forests in Costa Rica, Honduras, Mexico and Panama. In Mex-

ico, its populations grow in MCF in the states of Oaxaca, Puebla and Veracruz.

It is likely that the current distribution of *Marattia laxa* is restricted, because after most of the municipalities with MCF in the state of Hidalgo were explored, only one population with very few individuals was found. This information is important, considering that the species is included in the Mexican standard NOM-059-SEMAR-NAT-2010 (SEMARNAT 2010), category “sujeto a protección especial” (subject to special protection).

Discussion

The records of both species in Hidalgo increases their distribution in Mexico and the number of species of pteridophytes in the state. The distribution of *Goniopteris schaffneri* was extended to 17.1 km southwest of Landa de Matamoros, Querétaro ($21^{\circ} 15'25''$ N, $099^{\circ} 04'58''$ W). While the distribution of *Marattia laxa* expanded 84.9 km northeast of Veracruz ($20^{\circ} 26'00''$ N, $098^{\circ} 20'00''$ W). However, emphasis is on the risk of the permanence of these ferns in the communities where they were collected (sites with many signs of disturbance and near human settlements) and the urgency of conservation strategies in these forests.

Acknowledgements

This research received partial financial support from the FOMIX-Hidalgo project “Diversidad Biológica del estado de Hidalgo” 191908 (tercera etapa) [Biological diversity in the state of Hidalgo, 191908 (third stage)]. The authors are grateful for the suggestions and comments of two anonymous reviewers who helped improve this article.

Authors' Contribution

ASG collected the *Goniopteris schaffneri* and *Marattia laxa* specimens. AGHA, ASG and YPA identified the material examined. All authors contributed to the review of herbarium specimens, and to writing and revising this article.

References

Álvarez-Zúñiga E, Sánchez-González A, López-Mata L, Tejero-Díez JD (2012) Composición y abundancia de las pteridofitas en el bosque mesófilo de montaña del municipio de Tlanchinol, Hidalgo, México. *Botanical Sciences* 90 (2): 163–177. <https://doi.org/10.17129/botsci.481>

Arreguín-Sánchez M.L, Fernández-Nava R, Quiroz-García DL, Acosta-Castellanos S (2009) Análisis de la distribución de las especies de helechos y afines del Valle de México, notas ecológicas y florísticas. *Polibotánica* 28: 15–36.

Lorea F Riba R (1990) Guía para la Recolección y Preparación de Ejemplares para Herbario de Pteridofitas. Consejo Nacional de la Flora y la Fauna de México, México, 12 pp.

Mickel JT, Smith AR (2004) The pteridophytes of Mexico. *Memoirs of the New York Botanical Garden* 88: 1–1054 pp.

Micke JT, Beitel JM (1988) Pteridophyte flora of Oaxaca, México. *Memoirs of the New York Botanical Garden* 46: 1–568.

Pérez-Atilano Y, Sánchez-González A, Tejero-Díez JD (2015) Species richness, distribution, and morphological variation of lycophytes and monilophytes in a semi-arid region of Mexico. *American Fern Journal* 105 (3): 238–256. <https://doi.org/10.1640/0002-8444-105.3.238>

Pérez-Paredes MG, Sánchez-González A, Tejero-Díez JD (2012) Listado de licopodios y helechos del municipio de Zacualtipán de Ángeles, Hidalgo, México. *Polibotánica* 33: 57–73.

Rojas-Alvarado AF, Tejero-Díez JD (2002) Una especie nueva de *Dennstaedtia* (Filicales: Dennstaedtiaceae) para México. *Revista de Biología Tropical* 50 (3–4): 1007–1012.

Salino A, Almeida TE, Smith AR (2015) New combinations in Neotropical Thelypteridaceae. *PhytoKeys* 57: 11–50. [10.3897/phytok.57.5641](https://doi.org/10.3897/phytok.57.5641)

SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales) (2010) Norma Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. *Diario Oficial de la Federación*. 2a Sección.

Smith AR, Pryer KM, Schuettpelz E, Korall P, Schneider H, Wolf PG (2008) Fern classification In: Ranker TA, Haufler CH (Eds) *Biology and Evolution of Ferns and Lycophytes*. Cambridge University Press, Cambridge, 417–448.

Tejero-Díez JD (2007) La riqueza florística del estado de México: licopodios y helechos. *Adumbraciones ad Summae Editionem* 27: 1–32.

Tejero-Díez JD, Torres-Díaz A, Mickel JT, Mehltreter KV, Krömer T (2011) Helechos y Licopodios In: Lorea F, Cruz A (Eds) *La biodiversidad en Veracruz, Estudio de Estado*. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Gobierno del Estado de Veracruz, Universidad Veracruzana e Instituto de Ecología, A.C., México, 97–115.